FINAL REPORT ON IT ISSUES IN SUPPORT OF THE PENSION REFORM

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I. BACKGROUND AND HISTORY

A. General Discussion

The Pension TA was launched in November 1977 to address structural and financial problems in the Mongolian state pension system. The Government of Mongolia, following the recommendations of the USAID Pension Technical Assistance Effort (Pension TA), undertook comprehensive reforms with the objective of eventually transforming the current pay-as-you go pension system into a partially funded pension system based on Individual Accounts. The pension reform has had a broad impact on how the State Social Insurance General Office (SSIGO) accumulates, maintains, and uses information and on how the organization depends upon computer technology. Under the reform:

- Every contributor under the age of 40 will have an Individual Account established to track their contributions to the Social Insurance Fund.
- Every contributor under the age of 40 will have an opening balance created for them based on their work history and salary record.
- Monthly contributions for every contributor under the age of 40 will be tracked and applied to their Individual Account starting in January 2000.
- On a yearly basis, every contributor will receive a computed interest adjustment based on both the contributions credited to their Individual Account and their opening account balance.
- On a yearly basis, every contributor will receive a statement showing their opening account balance, the interest credited, and their closing account balance.

A full discussion of the new scheme is beyond the scope of this report. What is important here is to understand the impact of these changes on the computer operations of SSIGO.

It is important to understand that changes in social policy often come with an implementation price tag. The pension reform is no exception. The pension reform necessitated major changes in SSIGO's organizational and administrative systems, particularly they use and depend upon information technology (IT). The primary objective of the information technology component of the Pension TA has been to assist the government in (a) understanding the IT requirements made necessary by the reform, and (b) making the operational changes needed to implement the new scheme.

The most significant change brought on by the reform was a shift in the orientation of data collection and processing. Prior to the reform, data collection and processing efforts organized information around employers. This was the most efficient method given the structure of the old pension scheme because it did not require the compilation and tracking of pension contributions at the individual level.

Under the old system, computers merely mimicked manual processes already established within the organization. While computerizing data was useful -- and it did streamline and make more accurate administrative processes in the field --SSIGO still could essentially depend on manual processes. There was always a paper trail available if computerized data failed or proved unreliable.

The pension reform requires SSIGO to change its entire approach to data collection and forces a complete reliance on computerized records. It would be virtually impossible for SSIGO to manually piece together and calculate a person's Individual Account information over time. Therefore, the new system demands far more careful treatment of

computerized data and the computer systems and networks that organize and store that data.

There were a number of implementation challenges presented by the reform in the area of computerization and information technology. Some of these challenges were:

- To develop and field a software program to receive opening balance data and calculate an eligible individuals opening balance.
- To create an individual record for persons born after 1960 who have made pension contributions under the old scheme.
- To improve SSIGO's ability to receive data from soums, Aimag and District offices.
- To modify existing software to track monthly pension contributions and apply those contributions to Individual Accounts.
- To develop a program to compute and credit interest to Individual Accounts.
- To develop a program to produce statements showing an individual's opening account balance, monthly contributions, interest credited and a closing account balance.
- To develop a program to compute benefits generated by an Individual Account and to compare these benefits against the minimum pension and to determine an individuals' eligibility for the minimum pension.
- To develop a program to compute benefits under the survivor insurance and disability insurance programs.

As mentioned, the pension reform necessitated switching the focus of data collection from employers to employees. This dramatically increased the complexity of data collection and management efforts. The basic foundation of any database design is the underlying structure of the data. Changes to the basic foundation, such as the structure of data records, often requires major adjustments throughout the computer code. It could be compared to adding a foundation to an existing house: much of the actual structure must

be torn apart and rebuilt. The code modifications necessitated by the pension reform were significant.

In the area of IT, costs can never be confined to one component of an information network. For example, changes to database designs will often require the upgrading of software. Upgrading software can necessitate upgrading hardware. Upgrading hardware can require new wiring and network equipment. In addition, there is constant innovation and change in the computer industry which often necessitates additional investment in hardware, software and networking equipment.

In many cases, it is difficult to separate the various factors forcing an upgrade of computer equipment. In the case of the pension reform, improving the IT infrastructure was essential although the linkages may not always have been apparent initially.

There is a natural tendency for donors to ask, "how does this activity relate to my project directly?" It often comes down to a judgment call as to the need and appropriateness of any given expenditure. In this project, the question of upgrading computers systems arose often because SSIGO's computer infrastructure was not adequate to support the data processing requirements of pension reform. It remains to be seen if the IT capacity, as it stands now, will be sufficient to enable SSIGO to smoothly and accurately introduce and administer the new pension system.

B. Methodology

The IT expert on the Pension TA made seven trips to Mongolia over the course of the project. Each of the trips lasted approximately 3 weeks. During these visits, he worked closely with staff from SSIGO's IT Center and established a good working relationship with them. The following chart lists the dates of his visits and the written deliverables associated with each visit:

Date of Trip	*Report Description:*	*File Name*
Jan 1998	Recommendations from first visit to Mongolia	Monplan1
Mar 1998	Spreadsheet of Required Tasks	Djttsk1.wk4
	Spreadsheet of Required Tasks with Timeline	Djttsk2.wk4
	Software Specification Document	Softspc
	Spreadsheet for Hardware Equipment Purchases	Hwspec2
Jun 1998	Spreadsheets of Opening Balance Calculations	Obal
May 1999	Report on Site Visit to Harhoron	Report_on_site
	Findings on the set-up of NT server w/ recommendations	Minute1
	Recommendations Regarding Additional NT Server Training	Nt_train.doc
	Spreadsheet of Certificate Printing Requirements	Print1.xls
	Spreadsheet of Sample Interest Calculations	Int_calc.xls
	Spreadsheet of Estimated File Sizes	File_sizes.xls
	Spreadsheet of Software Testing Regimen	Sw_test_plan
	Spreadsheet of Tape Backup Rotation Schedule	Tape_bkup.xls
	Trip Report	Final_rec
Sep. 1999	Report – Answers to a Number of Questions	Djt925f

	Report of NT Specialists Findings and Recommendations	Report_Max.doc
Jan. 2000	IT assessment as of January 2000	IT_ass.doc
	Findings and Recommendations from January Visit	Finalrep.doc
	SSIGO Social Policy Management Information System Draft	Spmis.doc
Jun. 2000	Final IT Report	ITFInal2.doc

Many of the above deliverables are included in the appendix to this report.

The role of the IT specialist has been to serve as a scout for the IT Center staff. This includes choosing a basic direction, clearing a small path and investigating obstacles which may be encountered along the way. In the course of his work, the IT specialist has:

- Traveled to several soum, Aimag, and District offices to review hardware, software, network and operational procedures.
- Met with several IT organizations both within government and outside to assess how other organizations perform similar IT related tasks. Organizations included:

  Banks
  Commercial enterprises
  Courts
  Municipal Administration offices
  Police Administration offices
  State Statistical Office
- Met with several local IT consulting firms to assess their level of knowledge and expertise.
- Met with several Internet and telecommunications companies to assess their knowledge and potential for providing services to SSIGO.

C. History

When the IT component of the Pension TA was begun, SSIGO had already begun an ambitious computer/software development project. In fact, the Pension TA started at the tail end of the rollout of SSIGO's social insurance information system. This rollout was approximately 80% completed when the Pension TA started in October 1997. The system included software to support SSIGO's administration of the following social programs:

- Pension Insurance
- Benefit Insurance
- Employment Injury and Occupational Disease
- Unemployment Insurance

This system is used to record employer contributions and disperse funds to the various social insurance accounts. It performs the accounting function of recording the data and payments. It is also used for calculating retirement benefits for prospective retirees. In general, the system handles a wide variety of administrative functions and does then reasonably well. The system was fully implemented at the Ulaanbaatar District offices at the inception of the Pension TA. It was still being implemented at most Aimag offices. At that time, computers were not being deployed at the soum level, except in a few isolated cases.

D. Description of SSIGO's IT Resources at Project Inception

Hardware: SSIGO had a Novell Network version 3.11 in place at SSIGO headquarters and at Aimag and District offices. The number of workstations attached to a server varied from site to site. At SSIGO Headquarters this Novell network served both the IT Center staff as well as the administrative staff at SSIGO. The hardware ranged from 386 to Pentium computers. These systems were, for the most part, outdated and technologically obsolete at the time the Pension TA was launched.

Software: As described above, when the Pension TA began its work, SSIGO was in the final stages of a multi-year project to deploy comprehensive software to support the administration of its social programs. The system was written by SSIGO's IT Center staff and is run in Clipper5 on a DOS platform in the multi-user Novell 3.11 network environment.

Organization: The IT Center staff at the inception of the Pension TA included:

- 5 programming/training staff
- 2 hardware technicians

This group is headed by Mr. Gan-Och who has been responsible for all computer activities at SSIGO since prior to the inception of the Pension TA. The IT Center staff is not covered by a standard government employment agreement, but rather are contractual employees hired directly by the IT Center. The staff negotiates their contracts with Mr. Gan-Och on a yearly basis.

Initially, we determined that the staff was technically capable of accomplishing the necessary tasks needed to implement the pension reform. It was clear, however, that the full support and cooperation of the IT Center would be absolutely essential to the successful implementation of the pension reform.

Further, we recognized that it would be most efficient to modify the currently deployed software to accommodate the changes required by the reform, and we recommended that the IT Center take responsibility for modifying the existing software.

E. Initial IT Implementation Plan

After an initial visit, a number of issues and concerns were identified. A report detailing those findings is included as an appendix to this report. The following are the key points of the original IT implementation plan:

- All re-design of the software should be done within the Clipper 5 environment. This means, as much as possible, the software changes should be kept within the framework of the current system.
- The Pension TA should develop the detailed specifications for the modified software in conjunction with the SSIGO IT Center staff.
- SSIGO and the Pension TA should develop a conversion plan so that little or no re-entry of data will be required by SSIGO staff. SSIGO should develop programs that will automatically perform any data management or loading tasks, to minimize demands on SSIGO staff.
- The Pension TA should work as closely as possible with the SSIGO IT Center staff. The Pension TA should rely on local Mongolian programmers for this effort and put them under the supervision of the SSIGO IT Center staff.
- The processing of the data should remain at the Aimag and District office level.
- Telecommunication operations should be done via modem with files being

transferred from Aimag and District offices to SSIGO Headquarters on a monthly basis. This data should be tested by the IT Center staff for quality and stored at the IT Center for the purpose of macro level analysis, as well as for providing backup for Aimag and District offices.

- SSIGO should purchase removable high capacity storage devices, such as "zip" drives, for the backup and transfer of data from Aimag and District offices.
- SSIGO's Aimag and District offices should only store data for the current year and previous year. These offices should store any data necessary for calculating a pensioner's benefit (using accumulated balance fields). The actual detailed history should be stored at SSIGO Headquarters.
- The IT Center should develop and enforce a regular backup procedure.
- The IT Center should separate development and data collection activities from routine office activities at the headquarters level.
- The IT Center should develop a plan for archiving all historical data for as long as necessary.
- The IT Center should implement an off-site back-up and storage plan.
- The IT Center should develop a detailed implementation plan and schedule for completing the implementation of the administrative software system.
- The IT Center should initiate a long-range plan to upgrade the networks to Windows NT or Novell Intranetware.
- The IT Center should initiate a long-range plan to re-write the software in a more modern language relying on client server architecture.
- The IT Center should explore opportunities to cooperate with other governmental agencies such as the Tax and Vital Statistics offices.

It is worth noting that these points were, for the most part, accepted by SSIGO and have guided SSIGO's actions with regard to implementing the IT component of the reform.

USAID, at the Pension TA's recommendation, provided SSIGO with an NT network with server and 4 workstations. The IT Center has been using this network for development

purposes, as well as for the storage of data. This equipment has been vital to SSIGO in implementing the reform.

In addition, an expert in Windows NT was retained to train the IT Center staff on critical aspects of Windows NT installation and operation.

F. Chronology of Major IT milestones:

Date	*Description:*
Jan. 1998	Initial visit by Pension TA IT expert
Sep. 1998	Delivery of NT network and associated workstations for SSIGO IT Center staff. (purchased with funds from USAID)
Jun. 1999	Pension reform legislation officially passed by Parliament
Jun. 1999	Software developed for collection of opening balances
Sep. - Dec 1999	Opening balance data gathered
Apr. 1999	Final completion of implementation of initial SSIGO program administration software at all Aimags

II. CURRENT STATUS OF IT IMPLEMENTATION

SSIGO has been active in its approach to IT development. Since the inception of the Pension TA SSIGO has spent a considerable amount of time and money improving its IT infrastructure.

A. Hardware

SSIGO has spent significant money in the past two years purchasing additional computers. In 1998 and 1999, it spent approximately $ 150,000 on computer equipment.

There are now approximately 311 computers throughout SSIGO. Some are newer Pentium machines, but many are older 486 machines. In addition, SSIGO now has approximately 112 printers throughout the organization. Most of these are dot matrix printers and some laser printers. The average age of most of these printers is two to three years. The condition of the dot matrix printers is generally not very good. About one-third are in need of replacement.

1. Hardware Assessment at SSIGO Headquarters

SSIGO Headquarters no longer has a fully functioning computer network since the IT Center moved to its own offices, located approximately one kilometer from SSIGO Headquarters. SSIGO Headquarters currently has a Novell server, located in the office of the Director General (Mr. Sukhbaatar). Only a few workstations are connected to this network via coax cable running at 2 Mbit. The central office has a collection of old 486 computers and some Pentium computers. This is not adequate for top-level management.

2. Hardware Assessment at the Aimag and District Offices

Every Aimag has a LAN with several attached workstations. Currently all servers are Pentium II's 233 mhz with 32MB RAM. In addition, every Aimag has at least one computer workstation running at Pentium 200MHZ with 32 MB RAM. The rest of the computers are 486's. Aimag offices appear to be using the computers effectively for recording social insurance payments, health insurance, etc.

Aimag offices have recently obtained 100 MB Zip drives for backing up data, as well as transferring data to the IT Center. All servers have a Travan backup device (1.6 GB). Use of the tape backup is spotty. There are many reasons for the general lack of diligence in the backing up of data, but the primary reason is a lack of understanding of the importance of maintaining reliable backups.

In addition, all Aimags have old UPS's (un-interruptible power supplies) that are, for the most part, no longer functioning due to battery failure and component damage.

Like the Aimag offices, the District offices are fully computerized. Currently all servers are Pentium II's 233 mhz with 32MB RAM. In addition, every District office has at least one computer workstation running at Pentium 200MHZ with 32 MB RAM. Again, however, the bulk of the computers are outdated 486's.

In general, the UPS situation and backup situation are slightly better than at the Aimag offices. With better power conditioning and closer proximity to the IT Center, District office equipment is generally in better shape.

3. Hardware Assessment at Soum Offices

Most processing of information at the soum level is being done manually. There are no plans for the mass introduction of computers in soum offices. At this time, it is still considered too expensive to deploy computers at this level. There is also serious concern whether the computers deployed at soum offices could be maintained properly by

SSIGO. It would be logistically difficult and expensive to provide adequate technical support and hardware repair for computers deployed at this level.

There has often been discussion about the purchase of laptops for use by Aimag offices which could be also loaned to soum inspectors for certain data gathering tasks. Currently, there are a few laptops available for this purpose. The Pension TA supports the idea of deploying laptops for intermittent use by soum inspectors, provided that SSIGO provides adequate training such that the laptops are handled properly and are used efficiently.

Until such time as computers are deployed at soum offices, it is essential that SSIGO put into place and enforce procedures for (a) the physical transport of hardcopy data from soum offices to Aimag offices, and (b) the entry of soum-generated data into computers at the Aimag level. To the extent that fielding computers at the soum level (or providing soum inspectors with laptops on a periodic basis) will enable data entry to be done prior to its arrival at Aimag offices, the better. In the long run, it is desirable, of course, to computerize the soums, but this is obviously contingent upon funding for hardware and also for computer training and maintenance that is not now available.

4. Hardware Assessment at the IT Center

As mentioned above, USAID (through the Economic Policy Support Project) provided a significant amount of new hardware and networking software for the IT Center. The IT Center has the most up-to-date equipment in all of SSIGO. Currently they have two Windows NT servers with a combined disk capacity of 46 GB. They currently have three

Pentium II's. In addition, they have a number of Pentium-based workstations. They have installed adequate backup devices on their servers. They have portable zip drives for collecting data from Aimag and District offices.

The network at the IT Center is currently an Ethernet 10 base-T with flat cable (not twisted pair). They currently have a 16-port 10 Mbit hub. They have a functioning UPS on the server. This network is adequate for the current level of activity. It may be desirable in the near future to upgrade the wiring and the speed of the IT Center network.

B. Software

The software SSIGO uses to administer its programs is outdated and relies on tools developed over a decade ago. The ability of these tools to work with Windows-based applications and to integrate with the Internet is highly limited.

1. Operating Software

SSIGO's main application programs run under DOS – including those used to administer SSIGO's social programs – was written in Clipper5, which runs in DOS. Novell 3.11 is also a DOS equivalent program. Many of the newer Pentium workstations in SSIGO have been equipped with Windows95. Although Windows95 is equipped with Mongolian fonts, the nature of Windows and DOS makes it difficult to transfer, view, and manipulate data between these two platforms.

2. Existing Application Software

SSIGO has developed a handful of custom programs for use by Aimag and District offices for tracking social insurance payments and benefits. These programs were developed in 1996 using Clipper5. They were designed to run on a Novell 3.11 LAN which has been installed in all Aimag and District offices. The programs have been modified several times over the years to reflect changes in the laws and regulatory framework. It took SSIGO several years to install and implement these programs across the country. Complete installation in all Aimags was completed in 1998.

3. Application Software Developed to Support the Pension Reform

Currently, the most critical activity for the implementation of the pension reform is the modification of the existing software to reflect the changes required by the reform. The major components of the new software are:

- Adding and Editing an individual record
- Calculating and recording an opening balance
- Recording the date, amount, and other required data for each contribution
- Deducting charges for administration and insurance benefits (survivor benefits, minimum pension benefits, and benefits for disabled persons)
- Accruing interest to Individual Accounts based on contributions and opening balances.
- Producing statements showing an individual's opening account balance, monthly contributions, interest credited and a closing account balance.
- Compute benefits and comparing these benefits against the minimum pension and determining an individuals' eligibility for the minimum pension.

- Computing benefits under the survivor insurance and disability insurance programs.

Each of these components will depend upon a number of smaller modules and utility programs to provide SSIGO with the required functionality.

Prior to the preparation of this report, the software was evaluated by the Pension TA. It appears to be 60% completed and to be designed to provide much of the functionality required by the reform, although there are still some policy areas that need resolution before the software can be completed.

The Pension TA has been told – and has no reason to believe otherwise – that the software will be completed by September 2000 and ready for testing at that time. It is important that the software be fully tested and debugged prior to being fielded because its deployment will be time-consuming and will require an IT Center staff member to handle the installation. Therefore, it is estimated that deployment of the software will not be completed until the end of 2000, at the earliest.

4. Internet & Data Communications

Currently, SSIGO's ability to transfer data is inadequate. The only way SSIGO can send and receive data is by physically transporting it overland. SSIGO must send zip disks by whatever means available from Aimag or District offices to the IT Center. For this reason, it can take several weeks for the IT Center to gather monthly data, which makes it virtually impossible for the IT Center to maintain current data. This encourages the continued practice of decentralized data collection and data management, which will

make it difficult for SSIGO to use of the data the IT Center maintains for program administration and management. The inability to develop an effective Management Information System is a major impediment to improving the overall administration of the organization.

SSIGO has only one Internet account available. It is a web-browsing account without e-mail. It is available through a dial-up connection to MICOM. The speed of the connection is often below 20Kbps. SSIGO relies very little on the Internet for accessing or publishing information. No data is currently being transferred by Internet.

5. IT Center Organization and Structure

Little has changed in the organizational structure of the IT Center since the inception of the Pension TA. The organization remains under the direction of Mr. Gan-Och. There has been little turnover in staff during the past three years. This is extremely fortunate as the existing software would be difficult to maintain and modify without this continuity.

The relationship between the IT Center and SSIGO has not changed either. The IT Center remains a "self-financing" entity, which means it charges SSIGO and its various units for services. Historically, SSIGO paid the IT Center from one budget account controlled by SSIGO Headquarters. As of last year, funds for computer services were distributed among the various Aimag and District office accounts. This change was not welcomed by the IT Center.

The staff of the IT Center are still technically "contractors" to SSIGO. This means they are not Civil Service employees and are not limited by the Civil Service pay structure. In general, the IT Center works exclusively for SSIGO. It is not clear what advantage this relationship offers to SSIGO or to the IT Center.

In 1999, the IT Center relocated its offices from SSIGO headquarters building to a new facility near the U.S. Embassy. Although some have felt this physical distance world create problems, it has not affected the IT Center's ability to provide services to SSIGO. In the future, however, the physical separation of the IT Center from SSIGO Headquarters is symbolically important, and it makes the integration of a Management Information System into the operations of SSIGO less likely.

In the final analysis, SSIGO has relied heavily on Mr. Gan-Och and the IT Center to handle many of tasks associated with the implementation of the reform. In many ways, Mr. Gan-Och has shouldered more than his fair share of the burden.

III. RECOMMENDATIONS FOR THE FUTURE

A. General Discussion

It is always difficult to predict future trends in the field of IT. The fast pace of change has consistently made planning difficult and has forced organizations to revisit their IT strategies every couple of years. In the case of the pension reform, there are a number of

factors that will affect the future direction of SSIGO's computing and data-processing activities. These include:

- Advances in computer technology worldwide, including the development of the Internet
- The acceptance and integration of new technology in Mongolia
- Developments in Mongolia's telecommunication infrastructure
- Funding for SSIGO computer operations

Worldwide, the computer industry continues to experience exponential growth in hardware development. For example, it took approximately ten years to go from 4 mhz processor speeds to 40 mhz speeds. It has taken only five years to go from processor speeds of 40 mhz to 400 mhz. (At this rate we will reach speeds 4000 mhz in two years!) Although processor speed is only one component of the "power" of a computer, it is the most significant factor. Similar growth has occurred in the development of memory capacity, bus speeds, hard drive speed and capacity, CD ROM, etc. The rapid pace of change in hardware development will significantly affect SSIGO's ability to harness computers and information technology in the future. Moreover, developments in hardware fuel further developments in software and other areas.

Progress in software development has been similarly explosive over the past twenty-five years, as is reflected by the following chronology:

- 1975-1985: CP/M and assorted 8 bit operating systems.
- 1985-1995: DOS Operating System (8 and 16 bit operating system).
- 1995-2005: Windows Operating System (16 and 32 bit operating system).

- 2005-2015: Internet Operating System (32 and 64 bit operating system).

Network Operating Systems have undergone a similar pace of change and have, in general, marched lock step with developments in hardware and operating systems. We are currently near the middle of NT or (multi-protocol) networks. The next generation of Network Operating Systems will continue to offer tighter and tighter integration between LANs and the Internet.

These cycles are important because the introduction of new operating systems can make existing application software obsolete. If a software development project takes three years to implement, an organization can find itself deploying software that is already obsolete by the time it is fielded. Any development of new software under Windows must be done with an eye toward the next generation of operating systems, which is already on the horizon.

Despite these worldwide trends, Mongolia is unlikely to experience the same rapid pace of development as the rest of the world. SSIGO is currently about five years behind the developed world in terms of its hardware and software. With limited budgets, it is not possible for SSIGO to achieve parity, nor is it feasible for the organization to try. SSIGO must work within its budget and develop its own solutions, balancing the relative merits of new technological advances with the cost such improvements bring.

The Internet is the most significant factor in IT development in twenty-five years since the development of the personal computer. Its impact on the world has already been dramatic and its most significant impact still lies ahead. SSIGO should begin to utilize

the Internet as much as possible. It is critical for SSIGO to embrace this technology and pursue it aggressively. Clearly there are several factors inhibiting SSIGO's ability to use the Internet effectively. Aside from the obvious problem of limited funds, there is also a problem with the limited communication infrastructure in Mongolia. The internal phone lines are not capable of supporting a high rate of data communications. While satellite technology is available, it is only cost-effective for downlinks (transmission from the satellite to the ground) and this does not satisfy the communications requirements of SSIGO.

Equally important is the shortage of funds for investment in improved infrastructure. It is important for SSIGO to seek out ways to share the expense and effort of improving its telecommunications infrastructure. Other governmental agencies transmit data around the country. For example, there is a project in place now to improve the transmission of criminal justice data from the Aimags to the main court system in Ulaanbaatar. Clearly, it is SSIGO's interest to actively support such efforts to improve and develop this infrastructure. SSIGO should work cooperatively with other governmental agencies to transmit data to and from soums and Aimags to central locations in Ulaanbaatar. SSIGO should actively seek out such agencies that have similar transmission needs and collaborate in developing joint efforts.

Despite the challenges created by limited budgets and telecommunications infrastructure, SSIGO should view the future with optimism. It should be active and aggressive in its attitude toward the future. It should be investing in learning the fundamentals of the new

technologies so when the time comes it will be prepared and ready to take advantage of them.

B. Hardware Recommendations

SSIGO has made some progress toward upgrading its computer systems. Although it still uses a number of technologically obsolete computers, it is able to function successfully. It is recommended that SSIGO continue to upgrade its PC's as much as possible, given limited funds for computer investment. It should make an attempt to phase out all 486 computers within the next three to five years, as these machines will become increasingly difficult and expensive to maintain and their utility will decline substantially.

1. SSIGO Headquarters

SSIGO Headquarters staff should have computers as good or better than the District offices and Aimags. As new computers are procured older computers should be distributed to the Aimag and District offices. This will become particularly important as SSIGO begins to develop and use Management Information Systems to improve its administration of its programs.

2. Aimag and District Offices

Aimag and District offices should be treated identically as far as computer hardware is concerned. Aimag and District offices should have a minimal configuration of a Pentium-based computer with 16 MB RAM running Windows 95.

3. Soum Offices

There has been a keen debate over whether the soums should be computerized. This has been debated vigorously. The Pension TA recommends that SSIGO attempt to introduce computers at the soum level on a soum-by-soum basis – but only if their introduction can be adequately supported by training and the computers can be adequately maintained. At the current time, funds for computerization are highly limited and are better spent elsewhere within the organization.

The issue of putting older, soon to be obsolete, computers in the soums merits discussion. Does it make any sense to move old computers to soum offices? We think that it does, but that there should be a minimum acceptable configuration. This cutoff should be a nothing less than a 486 with 8MB RAM and a functional hard drive. In addition, such computers should be capable of running a Windows-based operating system.

We recognize that these computers may serve no actual purpose. (The likelihood that they will continue to function in the soum environment is uncertain.) But even if they do not function for very long these computer will still have some benefit, primarily in terms of training soum inspector in the use of computers. This may go along way toward preparing soum inspectors for the eventual introduction of computers at soum offices.

4. IT Center

It is critical that the IT Center have high-quality computers and computer equipment if it is to continue to spearhead SSIGO's computer automation effort. Fast, powerful

computers will enable this unit to work efficiently. The minimal configuration at the IT Center should be a Pentium II with at least 32 MB RAM running Windows 98 or better.

C. Software Recommendations

1. Operating Software

As mentioned before, the operating software used by SSIGO is antiquated and should be improved. The software currently runs under the DOS operating system, which is limiting. In the next few years, the software should be converted to a more modern platform such as Windows. It will become increasingly difficult to compile, manage, and share data across operating platforms.

Currently most Aimag and all District offices have many computers running Windows. Windows should be adopted as the standard operating system.

2. Application Software

As mentioned above, the Pension TA believes that it would not have been practical to have re-written SSIGO's application software for Windows in the timeframe required by the reform. The cost and time involved in such an activity would have been prohibitive and may have jeopardized the ultimate goal of introducing and managing Individual Accounts.

Still, SSIGO must be prepared to abandon the DOS environment in the near future. Worldwide, new software development projects are being written almost entirely to run

under Windows, and, as noted above, we are currently half way through the life expectancy of the Windows operating system. The Internet operating environment is on the horizon. At the present time, much of the software in the developed world is being designed to integrate with the Internet. The Internet is ideal for any software (such as SSIGO's) which requires the input and processing of information from remote locations.

The Pension TA recommends that SSIGO begin developing the skills and knowledge required to take advantage of the Internet. This means that SSIGO programmers should be learning techniques for writing software for the Internet. Particularly, they should be learning about HTML, XML, Java and ASP(Active Server Pages). The next generation of software will utilize these tools.

In addition, most large software systems now rely heavily on client server architecture to enable data to be processed quickly under a Windows environment. Any software that integrates with the Internet will also require client server architecture. This means that such software will need to be written using an SQL database engine on the back-end. Microsoft SQL Server would be a good choice for the database engine for the next generation of SSIGO software. The front end software could be Visual FoxPro, Delphi, Visual Basic or Microsoft Access. ("Front end" refers to the software programs which users see and interact with. Those programs then feed and receive information from the more powerful, "back end" database programs that actually process the data for the front end programs.)

There has been some debate over which language to use for the next round of programming. The two emerging candidates are Visual FoxPro and Delphi. There are arguments for and against both of these possible languages.

Delphi:

- Pro: easy to distribute as an executable.
- Pro: a very powerful language extremely compatible with Windows
- Con: developed by Borland and the company has been sold a few times.
- Con: no inherent database engine.
- Con: high learning curve, particularly for Clipper programmers.

Visual FoxPro:

- Pro: developed and is supported by Microsoft.
- Pro: easier to learn for former Clipper programmers
- Pro: has an internal database engine
- Con: not as easy to distribute across systems.

There are problems with updating the current software to a more modern platform. These include:

- Upgrading the software to run under Windows and to be accessible via the Internet requires that a significant amount of SSIGO's hardware be upgraded. The minimum standard would be a Pentium computer with at least 32MB RAM.
- SSIGO's administrative software will need to be completely re-written for any new platform. This represents a major commitment of time and resources.
- The software language and database engine will require extensive training for SSIGO's programmers. These products are more difficult to learn and it may be difficult to get adequate training in Mongolia.

- Mongolian fonts are not compatible between DOS and Windows. This presents some problems in a mixed platform scenario. It would be better to have all data and programs running on the same operating system.
- Implementing any Internet software in Mongolia will require much better Internet access for Aimag, District offices, SSIGO Headquarters and the IT Center.

We recommend that SSIGO begin planning to re-write its software to run under Windows and to utilize the Internet, recognizing that this represents a major investment of time and money and, thus, will take time. The software should be written to utilize a standard SQL. In addition, we recommend that the IT Center staff be trained more extensively on the Internet and Internet programming techniques. We further recommend that SSIGO turn the maintenance and development of its website over to the SSIGO IT Center. The IT Center should be more involved in developing Web sites, as this will enhance their knowledge and understanding of programming in an Internet environment.

D. Networking Recommendations

SSIGO must eliminate its reliance on Novell NetWare 3.11 in the next few years. This means phasing out this Network Operating System in every location it is currently deployed. Novell NetWare 3.11 is no longer supported and will become more and more difficult to maintain. Windows NT is a suitable choice to replace NetWare 3.11. In some smaller Aimag and District offices a Windows peer-to-peer network may be sufficient.

There has been discussion about upgrading to IntraNetware or Netware 5.0. The Pension TA has no inherent objection to this. This may be attractive if most Mongolian enterprises adopt IntraNetware as the upgrade path for Novell 3.11 or 3.12.

Short of making a wholesale switch from Novell 3.11 (which would be prohibitively expensive), the Pension TA recommends SSIGO take an interim step. SSIGO could add a Windows NT server into a Novell 3.11 network mix. In this way, the move from Novell 3.11 could be accomplished in a more gradual way. Because Novell 3.11 and Windows NT can coexist on the same network, this would eliminate the need for a complete replacement all at once. This would require the installation of the DOS client for Windows NT on all DOS workstations. This should be tested at one site before any decision is made about proceeding in this manner.

Along with phasing out Netware, the existing cable topology must be replaced as well. The 2Mbit Coax ring topology needs to be replaced. A10/100 Ethernet network using Category 5 twisted pair cable is recommended. Again, because of the difficulty of mixing Coax and Twisted pair in the same LAN it would make sense to upgrade the entire LAN at one time. This would mean replacing all NIC's (network interface cards), cables and hubs in one step. Because this is an expensive undertaking it should be phased in over the next few years. Aimag and large District offices should be converted first.

E. Data Communication and Internet

Data communications and Internet use is an area which should be given high priority. The current method of data communication is not adequate and makes the goal of (a) establishing a centralized national database, and (b) building a Management Information

System difficult to attain. Transferring data by zip drive is very inefficient. The Pension TA recommends the following changes be implemented within the next two years:

SSIGO should co-locate its 10GB server (they currently have 2 NT servers) at an ISP site. This is very popular in the US and has many advantages for both the client and the ISP.

- ISP's generally have a better infrastructure for housing and supporting servers.
- It is more secure to maintain a separate server from those of the ISP, as it does not mix public and private systems together.
- Excess Internet capacity could be re-sold or distributed to SSIGO sites (such as to SSIGO Headquarters).

SSIGO should purchase a modem-pooling device to allow for 8-16 - 32 network connections. Initially, 8 would be adequate and, as demand increases, this could be increased.

Standard dial-up modems should be used at the various nodes (Aimag and District offices etc.). These could rely on existing phone lines and would deliver between 28.8 kbps and 33.6 kbps transmission to each location.

SSIGO should expand its knowledge and understanding of the Internet. For this reason, the Pension TA has recommended the above-mentioned co-location of the server at an ISP site. By working on a server that is actually connected to the Internet, the SSIGO programmers and staff would gain better knowledge of programming for an Internet environment.

The 10GB server that is not being fully utilized at the IT Center would make an ideal communications server. Data could be transferred to this server from Aimag and District offices. Once data is accumulated on this server it could then be replicated to the IT Centers 36 GB server. Further, the data could be replicated to SSIGO Headquarters as well.

In addition, it would be beneficial for SSIGO to increase the speed of its connection to the Internet. The Pension TA recommends that the Data Center purchase a high speed Internet connection such as a Direct PC Satellite Internet connection. The cost of this would be about one hundred U.S. dollars per month.

The Pension TA understands that SSIGO and the IT Center cannot afford to make all of these changes overnight. The recommendations here are meant to help SSIGO plan for future improvements. The current system will continue to function, albeit with increasing inefficiency, for the foreseeable future. However, the current system is destined to become antiquated. This will present SSIGO with a very expensive choice in the future. SSIGO can avoid this by upgrading and improving the system on an incremental basis.

F. Organization and Administration Recommendations

As the collection, maintenance, use, and storage of data becomes more and more integral to the functioning of SSIGO, it appears that the "self financing" concept of the IT Center may work against the interest of SSIGO. The possibility that the IT Center might succeed in selling its services elsewhere creates risk for SSIGO. Self-financing is a

strategy that is beneficial for SSIGO as long as it never actually happens. Thus far, it has worked to SSIGO's advantage, only because the IT Center has not landed any other major clients.

There are compelling reasons to hire contractors or consultants to perform specialized short-term tasks. One such short-term task is software programming. It is often difficult to hire highly skilled programmers for short duration assignments through the normal civil service hiring practices. Thus, the hiring of staff on a contractual basis for these purposes makes sense. However, there are a number of staff at the IT Center who do not fall in this category. They are responsible for on-going, day-to-day computer support. These positions are not suited for contractual employment but are more suited for full-time civil service.

The Pension TA recommends that the IT Center employ both contract employees and full-time civil service personnel. This would assure continuity without sacrificing the benefit of hiring short-term highly skilled personnel for specialized tasks, as described above.

We feel it is time to eliminate the concept of "self-financing" and establish a more committed relationship between SSIGO and the IT Center.

G. Training

It is critical that SSIGO and the IT Center invest in training in the area of computers and information technology. It is impossible for the IT Center staff to stay current and learn

new techniques and new products without a more serious commitment to hands-on training. While it may be difficult to obtain this kind of training in Mongolia, it still needs to be explored. It may be necessary to send staff for training outside of Mongolia or bring trainers to Mongolia from abroad. In addition, there are valuable training programs available over the Internet. It is important that SSIGO commit sufficient resources and time to this training.

H. Management Information System

Thus far, SSIGO has focused primarily on the task of collecting, processing and storing data being gathered at the soum, Aimag and District offices. Since the task of data collection is not yet complete, there has been little attention paid to developing a national database. Currently, there are some preliminary countrywide data files that have been collected at the IT Center. These files are currently not being used for any analytical purposes. The IT Center has developed some plans for using this data, but there is no formal policy regarding this. SSIGO management does not appear to fully aware how this data might be used to improve its administration of the social insurance program

It is important that SSIGO does not lose sight of one of the primary reasons for collecting this data in the first place – which is to improve its ability to manage and administer its social insurance programs. SSIGO must pay careful attention to the important goal of providing reliable, flexible, analytical data to its own staff, as well as to researchers, planners and policy analysts. This is a fundamental responsibility of SSIGO and the IT Center.

In line with this, the Pension TA has developed a blue print for the development of the Social Policy Management Information System or SPMIS. The Pension TA believes that an organizational unit within SSIGO should be established and tasked with the dissemination and analysis of data gathered by SSIGO. It should be staffed by persons with skills in policy analysis, economics, statistics and computer programming whose main operational task is to provide analysis and interpretation of SSIGO's data and information.

It is not within the scope of this report to elaborate more fully on the makeup and nature of this unit. Appendix I includes a draft concept paper that outlines the following issues related to the makeup of this unit.

- The Background and Need for SPMIS
- The Main Characteristics and Philosophy of SPMIS
- The Main Objectives of SPMIS
- Proposed Structure and Management
- The Major Program Elements of SPMIS

IV. CONCLUSIONS

It is the Pension TA's assessment that SSIGO has the necessary computer resources and skills to complete the implementation of the pension reform. It is anticipated that the completion, testing and fielding of the new software will require six months. The expected date of completion is January 2001. Once the software has been fielded to Aimag and District offices, SSIGO will be able to track contributions to Individual

Accounts and perform the steps necessary to manage these accounts. There are no insurmountable obstacles standing between SSIGO and the successful implementation of the reform.

With regard to the overall use of computers and information technology by SSIGO, the Pension TA believes that much work remains to be done in order to bring SSIGO's computer operations up to a level that will allow it to function as efficiently and effectively as is necessary. As outlined in this report, there are many areas where investment and improvements are required. Information Technology is an area where continuing growth and development will always be necessary. It is the Pension TA's hope that SSIGO will continue to give high priority to the upgrading of the IT Center and the computers in SSIGO. Investing in computer technology must remain an ongoing process at SSIGO and be given high priority. Undoubtedly, computers will continue to play an increasingly important role in the management and administration of SSIGO.

The Pension TA strongly encourages SSIGO to highlight the need for funds for investment in computers, computer equipment, and Management Information Systems in its discussion with bi-lateral and multi-lateral donor institutions.

V. APPENDICES

APPENDIX 1: INITIAL REPORT OF IT EXPERT (JANUARY 1998)

I. Overview

The purpose of this report is to document my initial findings and recommendations during my trip to Mongolia relative to the information technology requirements for the Pension Reform TA. My initial task was to assess the ability of the hardware, software and networking infrastructure at SSIGO to implement any pension reform activities. In addition, I analyzed the personnel resources in place to implement any required changes. This involves reviewing the current state of systems operations and estimating future requirements and capabilities.

The systems required to run a major public process such as the Social Insurance program of a country the size of Mongolia is not a static process. A system of this size and scope will never be "completed" but will be in a constant state of development, upgrading and implementation. It is therefore fallacious to view this process with a final point of conclusion. Rather it is better to view it as an ongoing process with major milestones. When one task is completed there will be some tasks in process or others just beginning.

For the purposes of the Pension Reform TA the milestone that I view as the most critical is the ability of the system to accurately account for individual and employer contributions for every contributor in the entire country. In addition, to be able to produce a report each year of a persons contributions and account balance. Further, to be able to be able to calculate either an actual or "notional" interest credit for each

Individual Account. Finally, the system must be able to calculate a steady stream pension benefit for any retiree. This will be referred to as the "primary goal" for this report.

There are many other milestones which can and should be accomplished both before and after we achieve the above primary goal. Some of these milestones will be required in order to accomplish the primary stated goal, others may be desirous milestones but may in fact slow down our ability to achieve the primary goal in the time frame required.

In general, there are no "impossible" impediments to achieving our primary goal. The only issues are the time frame and money required. In this report, I will outline as much as possible my estimates in both these regards.

II. Methodology

I arrived in Mongolia on 1/20/97 for a three week visit ending on 2/6/97. During that time I have interviewed several people within SSIGO as well as some organizations outside of SSIGO. The following is a list of some of the people and organizations I have met with:

- Mr. Gan Och - SSIGO Computer Center Director
- Mr. B. Sukhbaatar & Staff - Head Finance and Accounting ITIBank of Mongolia.
- General Accountant and Staff - Police Administration Office.
- Governor and Staff - Aimag Dungobi-Mandalgovi
- Governor and Staff - Soum Delgertsogi

- Governor and Staff - Soum Luus
- Mr. Tseveenjau - Head of SSIGO Office, Aimag Darkhan-Uul.
- Mr. Erdine-Ochir - Head of SSIGO Office Arkhangai Aimag Office.
- SSIGO Computer Center programming staff
- Mr. T. Tsedev - State Center for Civil Registration and Information
- Ulaanbaatar Songinchairhan Social Insurance District Office

My basic technique has been interview and observation. In addition to the above, we have requested information from SSIGO staff. Further, we are planning to send a questionnaire to all Aimag SSIGO staff to assess its exact status with computer implementation.

III. Current Findings

A. Current Computer Operations in SSIGO

1. SSIGO Headquarters Level

Currently, SSIGO Headquarters, (SSIGO Headquarters) has a computer support staff of 15. They are divided into the following job categories:

- 5 programming/training staff
- 2 hardware technicians
- 7 training staff.

This group is headed by Mr. Gan-Och who is responsible for all computer activities at SSIGO. The Computer Center staff are not covered by the standard government

employment, but are contract employees with the Computer Center. The staff negotiates their contracts with Mr. Gan-Och on a yearly contract basis.

My initial findings are that the staff is quite capable of accomplishing the necessary tasks needed to implement the primary goal. Any modification to software and changes to the system will require the full cooperation of Mr. Gan-Och and Computer Center staff. I believe that I can work effectively with Mr. Gan-Och and we will be able to work well together to achieve the primary goal.

The SSIGO headquarters currently has one server and 20 workstation computers. The server is a P-166 with 64 MB RAM and 5 2GB hard drives for a total capacity of 10 MB. A Novell 3.11 network operating system running on a coaxial 2 mbit peer-to-peer network.

The workstations are a variety of computers from 386 through Pentium computers. This accounts for all the computing capability at SSIGO Headquarters including the processing of SSIGO data processing as well as the local office automation.

2. Aimag and District Office Level

Currently all 21 Aimags and eight Ulaanbaatar District offices have a local area network installed. The network operating system is a Novell 3.11 server with anywhere from 3 to 10 workstations attached. These networks were installed within the last two years. In general, it took a team of three people, 7 days to set-up the network and provide training

to the Aimag. A complete inventory of Aimag equipment has been requested from SSIGO staff.

From our small sample, it appears that most Aimags do not have much trained computer staff either within SSIGO or outside of SSIGO. This can present problems when technical problems arise with the hardware, software or networks.

In addition, we have observed from our sample, the data backup is not being performed in any systematic way.

3. Soum Level

In general, soums are not equipped with any computers for Social Insurance purposes. We have discovered on our visits and through interviews that some s have computers available in the Governors office. These computers are being used for general statistical reporting. In addition, we found out that Aimag Darkhan-Uul has computers in its four soums up and running the SSIGO system.

Again, the observation was made that soums do not have trained personnel available for fixing computer problems when they arise. Of the 16 computer in the soums of Aimag Dundgobi 4 were in for repair at the central Aimag.

B. Current Software Operations in SSIGO

For the past several years, the SSIGO Headquarters staff has been working on a Clipper 5 software program for the processing of all social insurance activities at SSIGO. This

software handles most of the processing activities performed at the Ulaanbaatar District, Aimag, and soum SSIGO Offices. It has modules for the five activities:

- Pension Insurance
- Benefit Insurance
- Employment Injury and Occupational Disease
- Unemployment Insurance

Through our interviews and observations, it appears that this software is currently fully installed and operational at all 8 Ulaanbaatar District Offices and a few Aimags. Most of the Aimags are currently in varying stages of implementation. While all Aimags have the hardware, networking and software installed it is not clear how far along each Aimag is in the entering of the data and processing of monthly contribution return.

In general, it is a time consuming process to load all of the required data into the current computer system. Information on every contributor, employer and pensioner must be entered and much of this information is only located at the soum. This information must be physically transported to the Aimag Center where it must be entered into the computer. This presents many logistical problems for all SSIGO staff since they must do this while performing their normal work duties.

C. Current Telecommunication Operations in SSIGO

Currently, there appears to be little or no telecommunications processing between the Aimags and SSIGO Headquarters. The transfer of data files via modem is not being done.

IV. Issues and Challenges Associated with new systems required for Primary Goal

The following are some preliminary thoughts on the Information Technology requirements of pension reform in Mongolia.

A. Level and Currency of Computer Hardware and Software

Currently, some of the components of the SSIGO computer systems are old technology. While the hardware appears to be recent technology the software, network operating system and communications process is currently outdated technology. This in itself does not present a problem and is not atypical of other government institutions even in the U.S. In the U.S. for example the Social Security Administration was notoriously behind in computer software technology. The argument was always, we have a system that works why "rock the boat".

Novell 3.11 Network Operating System is very old and is being phased out in most systems in the U.S. It does appear to be very prevalent in Mongolia. Upgrading to a more modern Network operating system (NOS) would require some effort on the part of SSIGO and would drain resources from the primary goal.

Clipper 5, while not as outdated as Novell 3.11 is older software technology which will need to be updated at some point in the future. It will be a major undertaking to change to a Windows-based system, which would delay achievement of the primary goal significantly.

In Mongolia, we can say "It took a long time to get to this point, lets not introduce any major structural changes which will require rewriting the software or major upgrading of Aimag or Ulaanbaatar computers". However, there are some changes/improvements which could be made which will not require major overhaul of the current operations.

The main incentive for Mongolia to undertake major computer upgrading at this time are:

- This may be an opportune time to approach lender institutions for money.
- Since pension reform will be undertaken, it may be an opportune time in terms of political will and resolve to obtain some necessary technology for future growth and expansion
- Certain older software components of the current system will be unsupported by vendors and it will become increasingly difficult to get services.
- It will be impossible to improve and expand the computer operations built on an outdated foundation.
- There is also a disincentive to undertake major computer upgrading at this time.
- There will be a significant amount of work associated with the reform of the pension system and any long range improvements may drain resources from the primary goal.

B. Availability of trained staff at Aimag Level

It appears from our small sample, that there is a serious problem in the lack of computer expertise at the Aimag level. While it is possible that this problem will correct itself as young people with more computer knowledge enter the workforce at the Aimag there is an immediate shortage of trained personnel.

This makes it very difficult to solve hardware problems at the Aimag or soum level. The result is that equipment must be shipped off to Ulaanbaatar or other places to be repaired. This creates additional problems:

- Serious delay in implementation schedules occur
- Often the rough handling and rough roads create as many problems as they solve.
- Very minor problems will require days or weeks to solve. Anyone who has worked with computers knows the number of "minor" problems that can occur.

C. Lack of adequate development environment at SSIGO Headquarters

Currently, all SSIGO computer activity occurs on one server. This means that office automation tasks are mixed in with software development, data transfer processes and storage of live SSIGO data. This hampers the ability of the programmers and computer center staff in testing and experimenting with new techniques and new software.

D. Lack of Quality Control in Data Collection and Processing

Currently, there appears to be no methodical, organized method of checking the data for mistakes and errors. It is clear that a system of this magnitude will experience data errors which need to be identified as soon as possible to avoid continued mistakes.

E. High Level of Interest in Computerization and Confidence in Current System

From our small sample, it appears that the staff and the general population at the Aimag and soum level are anxious to participate in any project of computerization.

There are many examples in other countries and in the U.S. of computer systems which have been attempted and have failed. This usually leads to skepticism on the part of participants and reluctance of people to participate in the implementation of any new system. Fortunately, in this case we are not facing this problem. It appears that people have confidence in the current system and are willing to make the effort to enter all the data because they see a "payoff" for them down the road.

We must avoid at all costs destroying this confidence. We do this by being exceedingly careful not to introduce major changes which require people to go back and do the same work twice. For example, we do not come back to them after they have just spent six months entering all of their contributor data and say "We need you to re-enter this data, but this time you are going to enter different fields of data"

V. Proposed Plan

From the IT perspective the following proposed plan appears to have the best chance for success within a reasonable time frame:

- All re-design of the software be done within the Clipper 5 environment. This means that we try, as best possible, to keep the software changes within the framework of the current system.
- The Pension Reform TA in conjunction with the SSIGO Computer staff will develop the detailed specifications for the modified software.
- We do not stop the current implementation process from continuing and, in fact, we try to speed up this process as much as possible.
- We develop a data conversion plan so that little or no re-entry of data will be required by SSIGO staff. We develop programs that will automatically perform any data changes or loading.

- We work as closely as possible with the SSIGO computer center staff. We use existing local Mongolian programmers for this effort and put them under the supervision of the SSIGO Computer Center staff.

- While eventually it would be desirable to have computers at the soum level, this will only drain resources from our primary goal and delay implementation. We propose to keep the processing of the data at the Aimag level. This would not preclude us from conducting a small test of computers at the soum level.

- Telecommunication operations should be done via modem with the files being transferred from the Aimag and District Offices to SSIGO Headquarters on a monthly basis. This data will be tested at the SSIGO for its quality and stored at SSIGO for the purpose of Macro Analysis as well as backup for the Aimag.

- As a secondary method of data transfer and storage, we should look into the purchase of some removable high capacity storage devices, such as "zip" drives for backup and transfer of data from Aimag and District offices.

- The Aimag will store only the current year and previous year data. They will also store all necessary data for calculating a pensioners benefit (using accumulated balance fields). The actual detailed history will be stored at SSIGO Headquarters.

- All Aimags will have a detailed backup procedure which they will follow on a regular basis

- SSIGO Headquarters will keep all historical data for as long as necessary.

- SSIGO Headquarters will implement an off-site back-up and storage plan.

- A detailed written implementation plan and schedule will be developed for completing the current system implementation and making any necessary changes to accommodate pension reform.

- We will begin a long range re-design plan for the system to upgrade the networks to Windows NT or Novell Intranetware.

- Begin long range plan to re-write the software in a more modern language using client server architecture.

- Explore opportunities for joint efforts with other governmental agencies such as Tax collection and Vital Statistics Offices.

VI. Proposed Schedule

It is my opinion that the primary goal can not be achieved by January 1, 1999. This is based on my current observations of the time required to accomplish the implementation of the current system. Currently, we are sending out a questionnaire to all Aimags to determine their estimate of when they will finish entering the data for the current system.

The main difficulty will be the loading of the data into the system in all the Aimags and soums. For example, I believe that the Dundgobi Aimag may not have all of its current soum data entered and they will not be performing full processing until 1/1/1999. This assumes no changes and delays caused by introduction of modifications to the software.

The following is a proposed time frame for implementation:

Task:	**Date**
• Complete software specification for new software	4/1/1998
1. Final Development and testing of new software	9/1/1998
2. Distribute Software to all Aimags and District office (install and test backup procedures and perform training on the new system)	1/1/1999
3. Complete all data loading for the new system	6/1/1999

VII. Recommendations

The above schedule assumes no additional resources will be made available to SSIGO for completion of the pension reform process except that which is already programmed into our contract (i.e. programmer time etc.). However, there are a number recommendations

I would like to propose which would improve the quality of the SSIGO activities as well as speed up the schedule:

- Install a separate computer center network for the data processing and development side of SSIGO. Use the existing network strictly for office automation and remove some of the disk drives and move them onto the new network.

- The new network would have a more powerful server with RAD level 1 at a minimum. In addition, the server should be more powerful and capable of handling much more data than currently possible. It should have an easy high capacity storage system like Zip drives for storing large amounts of historical data.

- Create several additional implementation teams, to go out to the Aimag and soums and train and assist current staff with implementation. These teams do not need to be programmers, but people who have been through the implementation process before. Possibly, they could be assembled from District Office and Aimag staff.

- Hire additional staff as required to assist the Computer Center Staff in the modification of the software.

- Create a quality control unit at SSIGO to examine and test data collected from the Aimags and District offices. This staff would be responsible for the collection of the data from the field to the central site and running edit/validity checks and data matching to make sure the data is as clean as possible. This group would also have the responsibility of assisting in any macro level analysis of the data which may be required by researchers and planners.

- Stock replacement parts for Aimag computers at the Aimag and identify and contract with local people to perform routine repairs and upgrades on the computers in the Aimag. This could be done in cooperation with other government agencies who supply computers at the Aimag and soum levels

- In conjunction with the backup procedures, develop a plan to install and use high capacity storage devices for data storage and transfer.

- Develop an incentive program for Aimags to reward them for extra effort in implementing the system and the data conversion. One possible reward could be to give the Aimag a laptop computer for staff use if they can implement the full system in less time than projected.

- Begin a controlled study to put computers at the soum level. This would be a small test to see how difficult it would be to utilize computers effectively at the

soum level and to explore the difficulties associated with this.

- Begin a long range training program for Computer Center staff to learn newer technology such as Windows NT, Object Oriented programming, SQL language, Client Server architecture and Internet programming.

- Begin a long range joint venture with other government agencies to improve data transfer methods from Aimags to Ulaanbaatar city. This would be a study to begin creating a secure network for governmental transfer of data between the Capitol and the Aimags.

The above recommendations would require some substantial financial investment to accomplish. We would recommend that SSIGO and the Government of Mongolia try to find either grant money or a low interest loan to subsidize these ventures. We estimate that $ 150,000 would provide enough seed money to accomplish many of the above proposals.

VIII. Issues/Problems to be resolved

The following are problems or questions which need to be resolved before final time estimates can be made:

- We need a firm decision about how the system will handle the beginning balances for an Individual Account.

- We are sending out a questionnaire to all Aimags, which will detail their estimates of when they will complete the entry of data for the current system.

IX. Next Steps

There are a number of proposals put forward in this report. At this point, I would like to have Mr. Sukhbaatar and Mr. Gan-Och along with the SSIGO staff review the report and

give their comments. I propose the following work be performed during my next trip at the end of March:

- Meet with Willum and Greg to identify all required data elements and changes required to the system to accomplish the required pension reform processing.
- Meet with Mr. Gan-Och and programmers to explain the requirements and plan the programming effort.
- Meet with Mr. Gan-Och to review all recommendations and plan an implementation schedule for all recommendations.
- Meet with Mr. Gan-Och to review his personnel situation to determine what additional programming resources he will need.
- Prepare budget estimates for accomplishing all recommendations and procuring necessary hardware as specified above.

APPENDIX 2: DESCRIPTION OF MODIFIED PENSION REFORM SOFTWARE

Module 1: Data entry program for original entry

Module for data entry program for contributor personal information.(original entry). This program will be loaded on to the laptops and desktops and will be used to upload into the main database. It should be a stand-alone executable.

Purpose: To allow the user to enter personal data about an individual. Fields should include:

1. name
2. ID#
3. type of employee (1-regular, 2-military/conscript, 3-government...)
4. soum ID#
5. Aimag ID#
6. current employer ID#
7. previous employer ID#
8. address
9. date of Birth
10. gender
11. start date of employment
12. total weeks of employment
13. current salary

14. type of pension (new system, old system)
15. location to send certificate (code 1-soum,2-aimag,3-employer,4-home address)
16. transfer (Y/N) -(did this person transfer Aimags this year)
17. date of last transfer
18. previous year Individual Account balance
19. current year Individual Account balance (unadjusted)
20. date entered
21. date of last update

Note: This is a first attempt at these fields and programmers can feel free to modify and add to this structure. Some fields such as address, total weeks of employment, start date of employment, etc., may not actually be gathered at this time. This will depend on the actual legislation and how it is decided to enter beginning balances.

Also, it is not clear exactly how to handle transfers. Clearly we need to have a record of every transfer of employment and/or Aimag. We may want to establish a separate file for transfer actions, or we could make it a special record within the record of payments files.

Module 2: Data entry program for existing data

Same purpose as module 1 except the people are already entered in the system and need to have certain fields updated with information. Again, this module will be a standalone executable which can be loaded on laptops and desktops. The data will be uploaded into the main system.

Module 3: Updating of contributor personal information

This module will add, edit and delete contributor personal information as in module #1. This module will be incorporated into the current system

Module 4: Allocation of payments to employee (non-voluntary) Individual Accounts

The purpose of this module will be to allocate for each employer contribution the amount of money going in to each employees Individual Account. When SSIGO credits the money (receives the notification that the money has been deposited in the bank), the system will generate a record in a new file/table which will link to the individual contributors record. It will have the following fields:

1. ID# (link to the employee ID#)
2. date of deposit
3. type of transaction
4. credit/debit
5. amount of payment/deduction to individual
6. employer # (link to the employer)
7. batch id# (link to the employers payment record)
8. employer contribution
9. employee contribution
10. date entered
11. Id of data entry operator

There will be a parameter stored in the system which will be used to allocate the amount of the contribution going in to Individual Accounts. For example, initially the amount

allocated for Individual Accounts might be 10% and 90% would go into the general fund. The program must also be able to adjust the percentage of the contributions based on the type of employer/employee: (1-regular employee, 2- military/conscript, 3-government) The program must be able to adjust payments for sick and disability. Also the system must address delinquent payments. There should be no ability to edit this record once it is generated. The only way to correct it should be through a balancing entry.

Module 5: Allocation of payments to voluntary contributors.

This module is the same as above except it allocates payments for voluntary contributors.

Module 6: Transfer Modules.

The system must be able to handle the transfer of employees from company to company and Aimag to Aimag. The transfer of companies within the Aimag should present no problem to the software. The major difficulty will be in the transfer of employees between Aimags. Since the record will exist in two computers we need to move the information form the old Aimag location to the new location. The old location must flag this record as transferred out, so that it will not generate a certificate for that person. The current Aimag will be responsible for generating the certificate.

I would propose a separate file to keep track of transfer actions. This could include any change to a persons information. This may be overkill, depending on the number of modifications and the importance of tracking this information. The file structure would be:

1. ID# (link to the employee ID#)
2. date of action
3. type of action
4. Description of change
5. date entered
6. Id of data entry operator

If transfer we need to also transfer the current year payment information as well as the persons summary history file for that individual. Eventually, we will keep all information on an individual in the central computer which will eliminate the need for this process.

Module 7: Interest calculation

On a regular basis we will need to be able to calculate the current value of the Individual Account. At the end of the year certificates will be generated for the current value of the Individual Account. This will be calculated in the following manner:

previous years balance* number of days in the year * current daily interest rate

Plus:

first payment amount * (current date - payment date)* current daily interest rate

Plus

second payment amount * (current date - payment date)* current daily interest rate

last payment amount * (current date - payment date)* current daily interest rate

The major difficulty will be if the certificate needs to be printed prior to the end of the year. Since the yearly interest rate will not be determined until the end of the current

year, we will need to assign an interim interest rate to be used during the year. The scheme is yet to be worked out, but we will probably use the previous years interest rate for the current year until the government issues the official interest rate for the year. When the government issues the current years interest rate, it will be plugged in to the parameter section to be used for current

At the end of each year we will need to perform a closing process. This will perform the following:

1. Calculate the final value of the current years account
2. Generate a record entry in the individuals summary payment history file
3. Add the previous years balance and the current year balance
4. Update the previous year Individual Account balance field on the person's record
5. Zero out the current year balance

The summary history file for an individual will consist of one record per year:

1. ID#
2. Year
3. account balance (unadjusted)
4. account balance (adjusted)
5. Transfer(Y/N)

Module 8: Output Module

This module will produce the following:

- Produce certificate

- Individual history report
- Monthly report of contributions
- Insurance report
- Custom queries

All reports must be able to print to screen, printer or file.

APPENDIX 3: ADDITIONAL TRAINING FOR COMPUTER CENTER STAFF

To: Christopher Bender
From: D. Jonathan Tomar
Re: Additional Training for Computer Center Staff

After reviewing the current state of the Windows NT installation at SSIGO Headquarters, I have determined the following issues:

- The disk drives are not configured optimally for the requirements of the Pension Reform database
- There is no adequate back-up procedure in place
- The backup software is not adequate
- There is no automatic shutdown of the server form the UPS.
- Currently, all available protocols have been loaded which will slow the network down.
- There is no link to the Internet.
- There has been no attempt to migrate any of the programs or files to the NT server.

Given the above issues, I believe it is essential that Mr. Gan-Och's staff receive NT training by September, 1999 at the latest. It is possible that we may need to reinstall Windows NT on the server. In line with this, I have interviewed three local firms for providing this training. I did not find any of the three firms suitable to provide this training. I would propose that we send an NT consultant from my firm in the U.S. to provide the training. We have worked on several projects of this size and scope and could provide the exact level of training needed. We could tailor the course to meet SSIGO's exact requirements. I have discussed this issue with Mr. Gan-Och and he concurs with my assessment. I would propose that Mr. Max Rubin, of Terrapin

Associates, Inc. accompany me on my next trip and that he provide the NT training to Mr. Gan-Och's staff. I would be available to assist while I carry on my detailed software testing and other tasks related to software implementation. Please advise me as soon as possible about this, because this issue must be addressed before we get too far into the data gathering phase.

Sincerely,

D. Jonathan Tomar

APPENDIX 4: OPENING BALANCE RECOMMENDATION

To: Christopher Bender
From: D. Jonathan Tomar
Re: Opening Balance Recommendation

Now that the details of the opening balance requirements have been defined to a large degree, I have the following observations:

It is my opinion that it will take approximately 188,650 man hours to complete the opening balance calculations.

Total Contributors	**700000**		
% born after 1960	0.66		
Total born after 1960	462000		
Type of Entry	Easy	Mod.	Difficult
% of Category	50.00%	40.00%	10.00%
Time to Prepare (Min.)	15	30	50
Total Hours	57750.00	92400.00	38500.00
Total Hours Required	188650.00		
# of people for 1 year	94.325		
# of people for 9 Mo.	125.7667		
# of people for 6 Mo.	188.65		
# of people for 3 Mo.	377.3		

Given the above calculations it is quite clear to me that without significant additional resources SSIGO will not able to create opening balances as required. I am proposing the following additional resources be considered by SSIGO and the Pension TA:

- Hire two additional staff personnel at each Aimag and District office for the purpose of entering opening balance data. This will require hiring approximately 60 people for a period of four months.
- Give a cash incentive to existing SSIGO staff to work weekends and nights to enter opening balances. I would propose a bonus of $ .05 or 50 Tugrugs per

completed opening balance (performed after hours or weekends)

	Number of Offices	Working Months	Added Hires	Monthly Salary	Total Cost
Aimag	21	4	2	$40.00	$6,720.00
UB	9	4	2	$50.00	$3,600.00
Total	30				$10,320.00

Work Days	# staff	OB's Per day	Total
100	60	30	180000

Total Contributors	220000
Bonus per OB	$0.05
Total	$11,000.00

The above additional expense will be in the realm of $ 20,000.00. It is my belief that without this additional effort the opening balance calculations will not be done in time to produce certificates in the year 2000.

Sincerely,

D. Jonathan Tomar

Information Technology Specialist

APPENDIX 5: TRIP REPORT / MAY 1999

To: Christopher Bender
From: D. Jonathan Tomar
Re: Final Comments and Recommendations
Date: 5/1/99-5/21/99

I have already outlined many of my findings in the following files:

- Minute1.doc (minutes of my initial meeting with Gan-Och
- Nt_training.doc (discussion of NT training requirements)
- Obal_recco.doc (Opening balance recommendations)
- Report on Site Visit (Report on the site visits to Ovorkhangia)
- Tape_bkup.xls (10 tape rotation schedule)

Opening Balance Calculation

The biggest problem facing SSIGO in the implementation of the Pension Reforms is the monumental task of getting opening balances. I believe that without additional resources, SSIGO will not be able to establish opening balances in the time required by the legislation.

Current Status of Central Computer Capability

SSIGO headquarters has not fully implemented the installation of the Windows NT network. There is still much to be done to make that installation fully functional. It is my recommendation that we bring an NT expert form the U.S. to work with Mr. Gan-Och and his staff on this task.

Software Development Progress

SSIGO has begun to analyze the changes required by the Pension Reform legislation to the existing software. Because the current software has already been developed and the new system will be a modification to that software, we do not have the luxury to design the new system from scratch. In essence, we will work within the current design framework. It will be important for the Pension TA team to keep tabs on the software development effort and to check on its progress. To this end I have designed a Software Testing Regimen which can be used to assess the progress of Mr. Gan-Och's staff.

Y2k Testing

I performed a Y2K test of the Novell server during our site visit to the Aimag and I am confident that we will not have a major problem in the year 2000 on the servers in the Aimag and District offices.

Opening Balance Program

I have met with Mr. Gan-Och and discussed in some detail the opening balance program that will be required. It is important that all administrative issues be resolved with regards to the opening balance as soon as possible, so the final program can be written and sent to the field.

How to Handle the Last Half of 1999 Opening Balance Calculations

I recommend that SSIGO give any contributor in 1999 full service credit for all of 1999.

I propose this for the following reasons:

- It will eliminate confusion by the many people who will be collecting the data and filling out the forms.
- It will eliminate any complaining by people who may feel they have been cheated in their opening balance calculation.
- It should eliminate the need for a large number of potential appeals on the opening balance calculation.
- Given our willingness to sacrifice accuracy for administrative ease, I think this will eliminate a large source of administrative costs.

Back-up Procedures

The back-up procedures both at SSIGO Headquarters and at the Aimag and District offices is inadequate. In all cases there appears to be no backup plans and no disaster plans in place. In most cases there is only one tape which is used over and over again. I have prepared a ten tape rotation plan for Mr. Gan-Och to implement at SSIGO Headquarters and at all Aimag and District offices. This will require the purchase of approximately 300 tapes at a cost of $ 7,500.

Printing Certificates

Because of the extensive amount of printing required for the certificates, I would recommend SSIGO consider purchasing one high speed laser printer. I have given Mr. Gan-Och the specifications for this printer. Since opening balances will not be printed for several months we have time to consider who will pay for the printer.

APPENDIX 6: SITE VISIT / MAY 1999

On May 11, 1999, Christopher Bender and I traveled to 3 locations to assess the current status of computer operations and the impact the changes to the pension law will have on the computer operations.

The following locations were visited: Uvurhangai Aimag Center - Avarkheer Soum; Zun Bajanulaan Soum; and Harhuran.

The following Chart identifies the statistical information for the three locations:

	Ardvarkheer	*Zun Bajanalaan*	*Harhoren*	*Total Aimag*
Population	20000	6000	15000	130000
Contributors		218	1677	6900
Pensioners		441	1468	12000
Employers		16	59	
% 1998			???	70%
% 1999			???	100%

1. Computer configurations in Aimag Center:

There are 9 computers at the Aimag Center. All the computers I looked at were Pentium computers . They were running Windows 95 Operating System. The server computer was a Pentium Computer with 16 MB RAM. They are running Novell 3.11, revision date 1991. I have been told that this is the standard server configuration in all the Aimag Centers

2. Y2k Issues at the Aimag Center

Based on the computers I checked there was no hardware problems with Y2k. All computers I tested were able to receive and hold a year 2000 date.

Novell 3.11 was not rated for Y2k compliance by Novell because they consider it too old to evaluate. Novell 3.12 the upgraded version of 3.11 is considered not Y2K compliant by Novell. There are patches to make 3.12 Y2K compliant. The only recommendation for Novell 3.11 is to upgrade to Novell 3.2 which is fully Y2K compliant.

I performed a Y2K test on the server by advancing the date to 2/29/2000. The system was able to hold the date and pass that date successfully to the workstation. In Novell 3.11 the workstation automatically receives its date form the server upon login.

The workstation was able (as previously mentioned) to hold the Y2K date as passed form the server.

My conclusion is that we will not experience major dislocations caused by the Y2K problem. If the servers for one reason or another can not automatically receive the Y2K date then the operator will be able to manually enter the date on the server . This is the worse case scenario and I do not expect that to occur. As I have mentioned on previous occasions, Novell 3.11 is an outdated Network Operating System and should be replaced . This would be a major undertaking in terms of cost and is not absolutely essential to Pension Reform.

3. How far are they in creating contributor records.

Currently, at the Aimag Center they have all contributors in the system. Since the software has not been revised for the pension reform yet, it is still in the original structure (by employer). They will have to create the individual record by computer process.

4. How far are they in collecting contribution information.

We were told that they have completed about 70% of the 1998 contribution information. They have completed 1999 through February. They claim that this is because the government has only paid salaries through February.

5. Will they be able to get the last five years of salary information.

They say with effort they will be able to gather salary information for each contributor from his current Social Insurance Book. It was estimated it would take about 40 to 60 minutes per contributor to gather this information.

6. Will they be able to get the total of months worked by an individual.

There was some confusion on this point. In every case they were not sure that they could in fact gather this information. After discussions with Mr. Gan-Och and Mr. Sumaakhuu they concluded that they could get this information for the service history books.

7. What is the future role of the computerized soum.

It is not clear to me that a computerized soum is of any particular assistance to the pension reform process. In general, the information form a soum should be sent through the Aimag Center. If processing the data can be done more efficiently by the soum using a computer, than by all means give them a computer. Only if a soum has a very large population and a very sophisticated computer operation should it be "promoted" to an Aimag and communicate directly with Ulaanbaatar. Clearly, Harhoren does not qualify for this treatment.

APPENDIX 7: MEETING NOTES / MAY 1999

Minutes of Meeting with Mr. Gan-Och on 5/5/99

1. What is the current configuration of the NT server

- NT server with 4 - 9 GB Disk drives (1 disk is currently out for repair)
- Total RAM: 128 MB
- RAD Level 0
- 8 Workstations
- Windows 98
- Network speed is 10 Mbits
- Currently there is no backup procedures in place
- Currently there is a UPS but no automatic shutdown of the server

2. Currently from my brief look at the NT server:

There is very little real work being done on the NT server. The setup of the disk drives on the server are not suitable for the long term processing of data. The disks are divided up into many small 2GB FAT partitions. I would recommend reformatting the drives to NTFS and make as many large partitions as possible. It appears that every available protocol has been installed on the workstations. I would remove all unnecessary protocols as they will slow down the network. Currently, there are no backup procedures in place and no disaster planning. I would propose that a back-up regimen for the Windows NT system be implemented as soon as possible. Currently there is no communication between the UPS and the network server. If the UPS hardware permits,

I would recommend implementing an intelligent link between the server and the UPS to provide un-attended downing of the server when power is lost. I recommend that Mr. Gan-Och and his staff should get detailed, technical training on Windows NT and its particulars

3. Have they begun designing and programming of the new pension system?

They have begun to design and program the necessary changes. As yet there are still some areas and issues which have not been thoroughly thought through. As yet they have not completed any of this to the degree that viewing or testing the changes can be conducted. When the law is passed the programming effort will begin in earnest.

4. What is the structure of the new data files?

There currently is a contributor file which has been compiled and contains about 1.8 million records. These files are still in separate DBF files by Aimag. There is no monthly contribution file developed. There is a file with everyone's monthly salary, This does not currently store the breakdown of contributions made. This will be one of the main changes to the existing file structure. Mr. Gan-Och is aware of the requirement.

5. What is the status of the contributor file:

Contributor file has been collected for each Aimag and Ulaanbaatar office and is housed on the Headquarters Novell server. It should be copied to the NT server.

6. Where will the main processing of information take place?

The Aimag and District offices will still be the main processors of information. They will be responsible for all data entry. They will transfer their data to the central office. It will be gathered in the central office and checked for quality control. The information will be transferred back to the Aimag from Central with any changes and transfers identified .

7. How will the data actually be transferred.

The data will be sent on zip drives for now. Mr. Gan-Och feels that the telecomm infrastructure in Mongolia is developing rapidly and within 2 -3 years this may done via telephone connection.

8. How will they print the certificates?

The certificates will be printed at the Aimag and District offices. It will be the responsibility of the local office to print and distribute the certificates.

9. Has any work been done on the modification of the software?

Yes, there has been some initial re-design of the software. It is not clear that any work has been done on the re-writing of the code.

10. How many programmers does Gan-Och have to work on this effort.

Mr. Gan-Och has four to five programmers available for this project.

11. Recommendations:

Bring in an NT expert, either local or foreign, who can conduct 10 day training program for Gan-Och's staff. Issues to be covered:

- Format the drives
- Mirroring and redundancy
- Communication with the UPS
- Backup Procedures
- Protocols
- Install Proxy Server

Q&A with Gan-Och's staff

- Upgrading of Aimag networks to a more modern NOS
- Upgrading the software to a more modern language
- Development of a VPN or other method for data transfer
- Selecting and implementing an analysis program for SSIGO

Testing of Novell 3.11 network for Y2K

Q & A with Gan-Och's staff about understanding of the Pension Reform requirements.

APPENDIX 8: ADDITIONAL TRAINING FOR COMPUTER CENTER STAFF

To: Christopher Bender
From: D. Jonathan Tomar
Re: Additional Training for Computer Center Staff

I believe very strongly that the SSIGO computer staff needs extensive training in Windows NT. Although, I am not a strong believer in extensive computer training,, in this case I feel it is a necessity. Having just completed an NT installation for one of my clients in DC, I know the difficulties and I am sure that without the training, they will have great difficulty in getting NT up and running properly.

After discussions with Greg and Gan-Och, there are a number of possible ways to do this:

- Send them to a course in Ulaanbaatar if one can be found
- Send two of Gan-Och's staff to Moscow or a Siberian city for a two week course.
- Bring an NT trainer in from the states for two weeks to train on-site.

I am not sure what the cost of such training would be. I do know some approximate prices from the U.S. In light of the fact that they went and bought all of the equipment, I would like us to focus on providing this training money for them. I can think of some additional courses which would be very useful down the road. I would like your thoughts on this subject so I can do as much as possible in this regard before I leave Mongolia.

Regards,

Jon T.

APPENDIX 9: REPORT BY MAX RUBIN, NT EXPERT

Please note, the structure of this report will follow a macro to microscopic course. That is, the comments will begin with general issues and observations and then migrate to more specific analysis and recommendations.

Upon evaluation of the Information Technology (IT) environment here at the SSIGO office in Ulaanbaatar, Mongolia, the overall rating is **good**. In particular, the performance capability of the computer hardware is sufficient and the configuration of the Server and Workstations are adequate. The technical capability of the computer support staff is high and continues to improve. In addition, the computer support staff here represents a cohesive group that both works and learns very well together. The following were the only two (2) environmental shortcomings observed here: 1. Frequent and sometimes lengthy power outages (please see the discussion of the UPS system below for the mitigation of this risk), and 2. The general unavailability of basic computing hardware and software (please see the discussions of the backup tapes and UPS communication cable below). The only technical problems observed here were on three core fronts: 1. Lack of Y2K compliance on the NT 4.0 Server, 2. Lack of a backup process, and 3. A lack of communication between the NT 4.0 Server and the UPS (Uninterruptible Power Supply). The only non-technical issue observed was a general lack of understanding of basic Total Quality Management (TQM) principles and their impact on increasing and maintaining the integrity of the pension data.

The lack of Y2K compliance on the NT 4.0 Server was addressed by applying Microsoft's Service Pack 5 (SP5) (previously, only Service Pack 3 was installed). The updated Service Pack was not only applied to the Server, but a thorough and fully translated formal presentation of Service Packs was included with the install. The installation of Service Pack 5 was successful. A factory pressed copy of Service Pack 5 was left for any future re-applications. The lack of a backup process was handled in three (3) stages. The first stage consisted of detecting and ultimately installing the drivers for the physical backup drive located in the Server (it is important to note that Seagate's Backup Exec drivers were used, not Windows NT's tape backup drivers). The second stage included loading Seagate's Backup Exec version 7.2 software for Windows NT 4.0 onto the Server. Again, not only was Seagate Backup Exec loaded onto the Server, but a thorough and fully translated formal presentation was included. The third and final stage of the backup process consisted of testing the entire backup process. Testing included scheduling trial backup jobs to be run overnight as well as restoring the test backup data to the Server. The implementation of the backup process was successful with the following exception: due to the lack of backup tapes (only one backup tape was available) I was unable to schedule all backup jobs and leave the SSIGO computer staff with a fully operational backup system. And finally, the last technical challenge concerning the UPS was addressed by installing Seagate's PowerChute software. The PowerChute software is an application that allows the UPS system to communicate (via a serial cable) to the NT 4.0 Server and to send a shutdown command to the Server in the event of a power outage. While the installation of the PowerChute software was fully

successful, the communication between the Server and the UPS system is not 100% functional because the proper communication cable is not available.

The TQM lecture, as mentioned above, was deemed needed in response to a general feeling after several days of interaction with both the pension data as well as the SSIGO computer support staff. It was discovered that the data contained a significant amount of errors and the SSIGO computer support staff lacked the knowledge to appropriately address these errors and failed to see themselves as part of a greater process. It is believed that the accuracy of the data can be greatly improved if each inaccuracy can be understood as a statistical "defect", and as such, be defined, discovered, and corrected. Then as a follow-through measure, the cause of the inaccuracy/"defect" in the data collection process can ultimately be corrected. It is important to note, as it was stressed to the SSIGO computer support staff, the errors in the data does not speak to the quality of the work performed by the computer staff either here in the headquarters or out in the soums or Aimags, but rather to the basic premise of TQM: "There is variability associated with any process."

In conclusion, from a technical perspective the SSIGO Pension Reform has an excellent group of capable computer people who have been given computer hardware capable of accomplishing their goals. The only two (2) pieces of hardware that are still in need are: ten (10) 4mm DDS3 DAT backup tapes and one (1) UPS communication cable from APC. Purchase orders have been prepared for the procurement of both of these articles.

APPENDIX 10: TRIP REPORT / SEPTEMBER 1999

Status Report as of 9/25/1999

1. Revised Budget for Mr. Gan-Och: I have reviewed the budget submitted on June 14, 1999 with Mr. Gan-Och. He informed us that this budget is no longer operative and he will replace it with a more current budget. He will submit this budget to Greg on Monday. This budget will focus exclusively on the needs of Mr. Gan-Och's staff and will not include any items for SSIGO field staff.

2. What is Mr. Gan-Och planning to do as his part of the training in Aimags in October: It appears to us that once again Mr. Gan-Och has been given the responsibility of data collection in the field offices, but lacks the authority or resources to accomplish the task. During the training session I attended with Mr. Gan-Och several Chair-person's were complaining that the opening balance training should not wait until October, but should be started immediately. Mr. Gan-Och explained that there were logistical considerations that prevented earlier deployment of the training.

It appears to me that, in fact. It is ONLY Mr. Gan-Och's staff who can install the software and explain how to use it. I have yet to see any other part of SSIGO with any knowledge of computers or the ability to use them. I believe that all of the Aimag and District offices rely totally on Mr. Gan-Och's staff for anything even remotely computer related. Until someone else in SSIGO takes any initiative, I fail to see how opening balance software can be deployed without the direct involvement of Mr. Gan-Och's staff.

3. Where is Mr. Gan-Och's staff in the process of rewriting the software for Individual Accounts: Currently, Mr. Gan-Och's staff has not written any code related to modifying the existing software for Individual Account balances. He has done a bit of planning and I was told (by the programmers) that the opening balance program will actually be the launch pad for the revision of the software. The programmers also implied to me, that they do not think it will be that difficult a job and I concur with that assessment. To date he has not officially assigned the task to any of the programmers I spoke with. It will, however, require some dedicated effort which to date I have not seen. I believe, Mr. Gan-Och may have some other priorities that is preventing him from actually assigning the work.

Mr. Gan-Och told me that he expects to have the software 50% completed by the first or second week in October. I can not assess this since I saw no evidence of any work on this effort. I believe that Mr. Gan-Och's staff is capable of developing the new software as required. The speed and skill at which he developed and deployed the opening balance calculation is evidence of the acumen of his staff. He has also told me that he is waiting on having some procedural issues resolved by the SSIGO Implementation Committee. Whether this is real or a red herring I can not say.

4. How will Gan-Och test the Individual Accounts software: At this point I was unable to discuss the testing regime in detail with Mr. Gan-Och or his staff, because they have not actually started writing the software. I discussed the necessity to test the programs in advance of their distribution and Mr. Gan-Och is fully aware of this. I

informed him that he should plan to demonstrate the software to Greg and I when there is something to see

5. Feelings on the likelihood of success on the introduction of Individual Account software: To me there are a few significant stumbling blocks to the success of the project. They are in order of importance:

Opening Balance Calculations:: After attending the training sessions at Bayanzurkh District Office and listening to the complaints and confusion, I am not optimistic about the opening balance calculations being completed by the end of calendar year 1999. The following are my observations:

Bayanzurkh , which by all accounts is the best District Office and the most organized is only 8% completed with their opening balance contributions. They have been working on it for approximately one month. I estimate they are entering 25 opening balances per day. If they continue at this rate it will take 480 days to complete the task. They confided to me that they are averaging four entries per hour at each computer. They claim this is mostly due to the slowness of the computers.

It is true that they have spent much of the time gathering the data prior to data entry. If this is the case then we may expect to see a rapid increase in the amount of data entered in the computer. I would urge that we collect the opening balance data from this district every two weeks and see if there is a rapid increase in the number of entries.

The main problem is the requirement for the staff to work overtime to accomplish the opening balance entries. The staff apparently works every night until 11:00 PM and all day Saturday and Sunday. The Chairperson also claims that many of the staff people sleep at the office rather than going home at night. I don't know if this is normal working conditions in Mongolia, but certainly it is extreme. I don't know how long this can continue and I don't know if every SSIGO office can get this kind of commitment from their staff.

Finally, if this is in fact the work schedule they have been keeping and they have only managed to collect 8% of the total, we can expect real problems in meeting the deadlines.

From the general talk, I don't think any of the Aimags have begun the process of collecting opening balances. Mr. Gan-Och urged them to begin this task as soon as possible and to report their progress to him every two weeks. We should monitor their progress carefully.

Computer Center Staff: Development/modification of the software is a critical part of the process and critical to the success of the project. I am concerned that Mr. Gan-Och is not further along with the software development.

As you know it is difficult to get a truly straight answer from Mr. Gan-Och about his financial relationship with SSIGO. I do not fully understand his arrangement with SSIGO nor the concept of "self-funding".

It appears that he has a negotiated contract with SSIGO to provide on-going computer support. The amount he is paid does not fully cover the costs of his operation. He is therefore encouraged or required to seek additional contracts to make up the short fall. Theoretically, this works to the advantage of SSIGO since they do not have to pay the full cost of their computer support. It works to Gan-Och's advantage; if he works efficiently he can make a profit from the resources at his disposal. This is fine if the total amount of work required by SSIGO is less than 100% of his capacity. The problem arises when he is required to do a lot of additional work without additional compensation. Gan-Och feels that he is being asked to take on a great amount of additional work, beyond 100% of his capacity, but with no additional compensation. For example, he has estimated he spent about $ 3,000 additional to create the opening balance program and field it. I surmise that he received no additional compensation for this effort. He believes that the re-writing of the pension software and all related activities will cost approximately $ 25,000. Again, he asks who will bear this cost?. He apparently can not cover this cost with his current stipend from SSIGO. Greg and I have requested a budget request from him for the cost of this work. He has said that $ 25,000 would fully cover the cost of his staffs time through March 31, 2000. I suspect that he could get by with less, but I am not prepared to say how much less. I will wait to see his budget and then make a comment.

6. How does Gan-Och plan to install the Individual Account software in Aimag and District offices: This will be done in December by sending out his staff. Again, it may be dependent on receiving money to fund the effort.

7. Any IT areas that need attention: I have stated the main concerns in question 5 above.

8. Readiness to handle the next 9-12 months: Again, I feel the major problem area is the opening balance calculation. I feel that the software modifications can be made within the time frame, if Mr. Gan-Och is fully motivated..

9. Recommendations for the future: I believe some or all of the following must occur in order to meet any semblance of a 2000 deadline.

- SSIGO must take responsibility both administratively and financially for the collection of opening balances. To date, I do not see anyone in SSIGO Headquarters taking the lead and initiative in Opening balance data collection. Logically, this should not fall under the responsibility of Mr. Gan-Och.
- I concur with Greg , that some dramatic steps must be taken to free up the time of the inspectors for opening balance calculations. Greg has suggested the cessation of recording pension contributions. I am not sure if this is feasible and/or if it will save a lot of hours of time since they must still record the health information. In any event, some creative thinking is necessary.
- As I stated in my memo of 5/18/99 the amount of additional resources in man-hours to accomplish opening balance calculations will require the hiring of a large number of additional staff.
- If no additional staff is hired, then I feel some strong incentive program must be put in place to encourage existing staff to work weekends and overtime to get the job completed on time.
- There appears to be a need for additional computers at the District Office level. Apparently, they feel they could accomplish the task more quickly with newer, faster computers. I believe the addition of one or two new computers, at each District Office would help significantly in the data entry process.

10. Monthly Transfer of data from Aimags to SSIGO Headquarters: We had a session with the staff and fully discussed the methods of data transfer. It appears that the

phone lines are to slow to be used at this time. Data between the District Offices and Headquarters can be transferred by phone lines, but the Aimag transfer will still need to go by Zip Disk..

11. Implementation Time Table: As mentioned above, we have the beginning signs of slippage of the time-table. I believe that we need to discuss this with Mr. Sukhbaatar and the senior SSIGO staff. In fact, Mr. Gan-Och requested that we have a meeting with Mr. Sukhbaatar about his funding problems.

APPENDIX 11: EQUIPMENT PRIORITIES

1. ***Printers - The primary exercise of the next six months will be the printing of certificates:***

    - A Hi-speed dot-matrix printer for SSIGO IT Center
    - A new reliable dot matrix printer at every Aimag and District office
    - New high quality Laser printers for The IT Center , Headquarters and selected Aimag and District offices.
    - Data Communication Equipment
    - A hi-speed connection to the Internet
    - A modem pooling device
    - Improved phone lines

2. ***Additional computers***

    - Continued replacement of older computers
    - Additional spare parts for repairing and upgrading older computers

3. ***Replace all non-functioning UPSs***

APPENDIX 12: SSIGO MANAGEMENT INFORMATION SYSTEM (MIS)

Draft Concept Paper by D. Jonathan Tomar, IT Expert

1. The Background and Need for SPMIS

Manipulation and Analysis of the basic data on Social Insurance contributions, employment information, pension information, health insurance, etc. is necessary for any coherent public policy planning process. The GOM must have readily available and accurate information about the details of the social insurance system. It is impossible to make good decisions about raising or lowering contribution rates, changing retirement ages, adjusting minimum pensions etc. without some ability to model or predict the impact of these policy decisions.

Therefore, we have proposed the development of a centralized Management Information System for all SSIGO data. This unit would be housed in the IT Center and the data would reside on the IT Centers NT server. The data would be a available to all government planners and decision makers. It would be easily accessed and manipulated and distribution of the information would be routinely presented on the SSIGO Web Site.

Currently, although there is data on contributions and pensions available from the IT Center it is not stored in any easy way for non IT Center programmers to get access to it.

2. The Main Characteristics and Philosophy of SPMIS

Social Insurance issues cut across all sectors of Mongolia's economic landscape. Currently there is no place for policy makers, both inside and outside SSIGO to go to get accurate data and information about social insurance. There is a strong need for this data to be accessible to various entities such as:

- Government Officials
- Industry planners
- Academics
- NGO's
- Journalists

SPMIS will be concerned with the following types of issues:

- Contribution rates
- Pension forecasting
- Macroeconomic forecasts and analysis
- Specific labor category analysis (Industry specific)
- Funding requirements
- Labor policy analysis (minimum wage, retirement issues, child labor regulations, occupational health and safety, etc.).
- Salary survey information.
- Employment/Unemployment

3. The Main Objectives of SPMIS

The over-riding objective of SPMIS would be to facilitate all aspects of the functioning of Social Insurance information in Mongolia. To achieve this, SPMIS should:

- Improve the coordination of social insurance data collection and distribution by the government.
- Support efforts to develop an early-warning system to assist policy-makers in responding to the implications of economic fluctuations on the social safety net.
- Promote public/private sector interactions and dialogue in the social insurance area.
- Strengthen flows of information and analysis of social insurance issues.

4. Proposed Structure and Management

- To be established as a separate unit within the SSIGO. It should be a semi-autonomous institute, with a for-profit structure but with a clear mandate to play a human resource development role.
- To be managed by a Board reporting back to SSIGO, but with sufficient independence to ensure innovative and effective programs.
- An institute director supported by program heads and required support staff.
- To be located near to a university to benefit from synergies with existing programs and facilities .

5. The Major Program Elements of SPMIS

Information Gathering and Analysis

- Compiling all relevant information on social policy
- Compiling relevant information on economic trends related to social safety net issues

Institutional Networking and Information Dissemination

- Providing access to all information on social policy issues to planners and analysts

- Provide information to the general public on social insurance issues.

- To provide forums for all key players in this sector to meet and learn about current and future trends.

Policy Advisory

- To advise all government agencies on the current and future trends in social insurance

- To help formulate legislative and regulatory policy as it relates to social insurance issues.

- To monitor and assess the performance of all sectors of the economy in their impact on social welfare.